Claims:

1. A computerized method of virtual flowbench simulation of fluid flow interaction with an object described in at least one design file, comprising:

Receiving user-defined input via a user interface, the user-defined input including a specification of the at least one design file;

accessing the at least one design file;

accessing a generic template describing basic geometries of the object, and modifying the basic geometries of the object with the at least one design file;

automatically generating surface and volume mesh in the object;

automatically simulating fluid flow interaction with the object and measuring and storing predetermined data parameters;

automatically checking the predetermined data parameter measurements to determine whether steady state has been reached and whether a predetermined maximum number of time steps has been reached;

automatically terminating simulation in response to one of steady state being reached and the predetermined maximum number of time steps being reached; and

generating an output of predetermined data parameter measurements.

2. The method, as set forth in claim 1, wherein accessing the at least one design file comprises accessing a solid model of a valve design.

3. The method, as set forth in claim 2, wherein receiving user-defined input further comprises receiving a selection of engine cylinder head valve study.

4. The method, as set forth in claim 2, wherein accessing a generic template comprises accessing basic geometries of a cylinder head, and modifying the basic geometries of the cylinder head with the solid model of the valve design.

5. The method, as set forth in claim 2, wherein receiving user-defined input comprises receiving a number of valves in the cylinder head.

6. The method, as set forth in claim 2, wherein receiving user-defined input comprises receiving a selection of intake or exhaust valve.

7. The method, as set forth in claim 2, wherein receiving user-defined input comprises receiving an indication of which of the intake or exhaust valve moved during simulation.

8. The method, as set forth in claim 1, wherein receiving user input further comprises receiving a selection of engine cylinder head port study.

9. The method, as set forth in claim 1, wherein receiving user input further comprises receiving simulation parameters.

10. The method, as set forth in claim 1, wherein accessing a generic template comprises accessing basic geometries of a cylinder head with geometries of an inlet, a port, and at least one intake valve and one exhaust valve.

11. The method, as set forth in claim 1, wherein accessing a generic template comprises accessing a definition of a data measurement region, simulation parameters, and mesh region scaling and resolution.

12. A computerized method of virtual flowbench simulation of fluid flow interaction with a part in a cylinder head described in at least one design file, comprising:

Receiving user-defined input via a graphical user interface, the user-defined input including a specification of the at least one design file;

accessing the at least one design file;

accessing a generic template describing basic geometries of the cylinder head, and modifying the basic geometries of the cylinder head with the part defined in the at least one design file;

automatically generating surface and volume mesh in the modified cylinder head geometry;

automatically simulating fluid flow interaction with the modified cylinder head and measuring and storing a mass flow data through inlet, port and outlet and around a valve displaced a predetermined distance from the inlet;

automatically checking the mass flow data to determine whether steady state has been reached and whether a predetermined maximum number of time steps has been reached;

automatically terminating simulation in response to one of steady state being reached and the predetermined maximum number of time steps being reached; and

generating an output.

13. The method, as set forth in claim 12, wherein receiving user input further comprises receiving an indication of whether a valve design or a port design is being simulated.

14. The method, as set forth in claim 12, wherein accessing the at least one design file comprises accessing a solid model of a valve design and receiving user input further comprises receiving a selection of engine cylinder head valve study.

15. The method, as set forth in claim 14, wherein accessing a generic template comprises accessing basic geometries of a cylinder head, and modifying the basic geometries of the cylinder head with the solid model of the valve design.

16. The method, as set forth in claim 14, wherein receiving user-defined input comprises receiving a number of valves in the cylinder head and a selection of intake or exhaust valve.

17. The method, as set forth in claim 12, wherein receiving user input further comprises receiving a selection of engine cylinder head port study.

18. The method, as set forth in claim 12, wherein accessing a generic template comprises accessing basic geometries of a cylinder head with geometries of an inlet, a port, and at least one intake valve and one exhaust valve.

19. The method, as set forth in claim 12, wherein accessing a generic template comprises accessing a definition of a data measurement region, simulation parameters, and mesh region scaling and resolution.

20. The method, as set forth in claim 12, further comprising notifying a user of simulation progress via electronic mail during simulation.

21. The method, as set forth in claim 12, wherein generating the output comprises generating a movie showing fluid flow in the cylinder head and through the port, inlet and outlet, and around the valve.

22. The method, as set forth in claim 12, wherein generating the output comprises generating a graphical plot of the mass flow data measured during simulation.

23. A virtual flowbench simulation system of a part described in a design file, the part being a portion of a component, comprising:

a graphical user interface operable to receive user-defined input specifying the design file, the type of part to be simulated, and other simulation parameters;

a generic template describing basic geometries and boundary conditions of the component;

an autogridding process operable to automatically generating surface and volume meshes in the component with the part described in the user-specified design file;

a computational fluid dynamic simulation process operable to automatically simulate fluid flow in and around the component and measuring data;

a controller operable to monitor the computational fluid dynamic simulation process and issue simulation progress reports, the controller further operable to terminate the simulation process when a steady state in measured data is reached or when a predetermined maximum time step is reached; and

a measurement data output process operable to format and output the measured data in a user-specified representation.

24. The system, as set forth in claim 23, wherein the generic template describes the basic geometries of a cylinder head having a predetermined number of intake valves, a predetermined number of exhaust valves, port configuration, and inlet and outlet.